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ART 26 AAMTC

WATCH INCLUDING IN THE BACK OF ITS CASE AN ELECTRONIC  
MODULE FOR STORING INFORMATION

The present invention relates to watches, generally wristwatches, whose cases incorporate electronic modules for storing information that comprise an integrated circuit or chip connected to an antenna consisting of a coil and are able to communicate by radio signals with a reading and/or writing device adapted at least to read the information contained in a memory of the integrated circuit and often also adapted to delete or modify at least some of that information and to add other information.

To be more precise, the invention relates to watches in which the electronic modules are passive, meaning that these modules do not need their own power supply, such as batteries or rechargeable batteries, to be able to operate, being supplied with power by the radio signals from the reading and/or writing device with which they co-operate.

Some watches of the above kind merely store an access code to private or protected premises or to ski slopes, for example. Others include electronic modules equipped with more complicated integrated circuits and may contain the medical records of their owner.

In some prior art watches, the electronic module is placed in a hollow and preferably removable bezel so that the module can be changed if necessary. This solution may therefore not be suitable for watches having any type of case. Moreover, if the case actually includes a bezel or a case-bezel, this complicates its fabrication and consequently increases the unit cost of the watch.

In other watches the module is placed in a space between the rear of the movement of the watch and the back of the case, which necessarily increases their volume. If the back of the case is made from a material that is not really amagnetic, such as steel, the magnetic flux emitted or received by the coil of the electronic module suffers high losses, and even if measures are taken to limit these losses, they are far from negligible. Finally, even if the back of the case is made from an amagnetic material, for example a plastic material, radio signals emitted and received by the coil of the module, which have to pass through the whole of the thickness of the back, suffer high attenuation.

The object of the invention is to provide a watch, in particular a wristwatch, that completely eliminates or at least reduces the drawbacks of the above prior art watches.

To achieve the above object, the watch of the invention comprises a case having a back, a movement contained in the case and an electronic module for storing

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information able to communicate by radio signals with a device for reading and/or writing the information, this electronic module comprising an amagnetic material base, an integrated circuit having at least two connecting terminals and fixed to the base and a send and receive antenna comprising a coil also fixed to the base and  
5 consisting of an electrically conductive wire having two ends connected to respective connecting terminals of the integrated circuit, the coil having an annular shape and surrounding a space in which the integrated circuit is placed, the watch being characterised in that the electronic module is housed at least for the most part in a cavity in the back of the case open towards the outside.

10 The cavity and the module preferably have an essentially cylindrical shape and are preferably situated at the centre of the back of the case.

Accordingly, unlike a watch in which the module is placed at the back of the case and entirely within it, in the watch of the invention signals emitted and received by the coil of the module have to pass only through the base of the module, which is  
15 much thinner than the back of the case.

It is possible to obtain a watch of the invention starting with an existing watch by forming in its back a blind hole with a shape adapted to that of the electronic module.

If the back of the case is removable, it is possible to replace it to convert an  
20 ordinary watch into a watch of the invention.

This being so, in one embodiment of the watch of the invention, the base of the module is cup-shaped and has a flat bottom to which the coil and the integrated circuit are fixed and a lateral wall around the coil.

This embodiment is particularly suitable if the back of the case is made from a  
25 magnetic material such as steel.

The invention will be better understood after reading the following description, which is given by way of example and with reference to the appended drawings, of several embodiments of the invention, in which drawings:

- figure 1 is a diagrammatic view in diametral section of an analogue display  
30 wristwatch of the invention;

- figure 2 is a view in diametral section to a larger scale of the portion of the back of the figure 1 case which accommodates a first embodiment of an electronic module incorporated into the back;

- figure 3 is an incomplete plan view of the electronic module shown in figure 2,  
35 showing how the ends of the wire of its coil are connected to respective terminals of the integrated circuit of the module;

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CLAIMS

1. Watch comprising a case (1) having a back (3), a movement (6) contained in said case and an electronic module (14) for storing information able to communicate by radio signals with a device for reading and/or writing said information, said module comprising an amagnetic material base (15), an integrated circuit (24) having at least two connecting terminals (26, 27) and fixed to said base and a send and receive antenna comprising a coil (23) also fixed to said base and consisting of an electrically conductive wire (28) having two ends (29) connected to respective connecting terminals of said integrated circuit, said coil having an annular shape and surrounding a space in which said integrated circuit is placed, said watch being characterised in that said electronic module (14) is housed at least for the most part in a cavity (13) in the back (3) of the case (1) open towards the outside.
2. Watch according to claim 1, characterised in that said cavity (13) and said module (14) have an essentially cylindrical shape and are situated at the centre of the back (3) of said case (1).
3. Watch according to claim 2, characterised in that said base (15) is cup-shaped and has a flat bottom (16), to which said coil (23) and said integrated circuit (24) are fixed, and a lateral wall (17) around said coil.
4. Watch according to claim 3, characterised in that the thickness of said lateral wall (17) increases slightly and continuously from its base adjoining said flat bottom (16) to its top so that it has an exterior surface (18) co-operating with an internal wall (19) of complementary shape of said cavity (13) and constitutes a dovetail joint between said electronic module (14) and the back (3) of said case (1).
5. Watch according to claim 3, characterised in that said lateral wall (17) of the base (15) has an exterior surface (18) that is a true cylinder and said cavity (13) has a cylindrical internal wall (19).
6. Watch according to claim 5, characterised in that said module (14) is fixed by setting said base (15) into said cavity (13).
7. Watch according to claim 5, characterised in that said module (14) is adhesively bonded in said cavity (13).
8. Watch according to claim 3, characterised in that said module (14) is crimped in said cavity (13).
9. Watch according to claim 3, characterised in that said base (15) is made of a plastic material.
10. Watch according to claim 3, characterised in that said base (15) is made of a ceramic material.

11. Watch according to claim 3, characterised in that said base (15) is made of sapphire.

12. Watch according to claim 2, characterised in that said base (15) comprises a substantially circular rigid plate to which said coil (23) and said integrated  
5 circuit (24) are fixed.

13. Watch according to claim 1, characterised in that said coil (23) is a self-supporting coil that comprises a plurality of layers of contiguous and substantially coaxial turns that are formed by a thin metal wire surrounded by a sheath of electrically insulative material and connected together.

10 14. Watch according to claim 1, characterised in that said coil (23) and said integrated circuit (24) are adhesively bonded directly to said base (15) and said ends (29) of the wire (28) of the coil are also fixed directly to said terminals (26, 27) of the integrated circuit by means of an electrically conductive material.

15 15. Watch according to claim 1, characterised in that said coil (23) and said integrated circuit (24) are fixed to the substrate (38) of a printed circuit (39) that has two connecting lands (40) situated between said coil and said integrated circuit to which are fixed said ends (29) of the wire (28) of said coil and two ends of two conductive wires (41) whose other ends are fixed to said connecting terminals (26, 27) of said integrated circuit.

16. Watch according to claim 1, characterised in that said module (14) has a portion projecting out of the back (3) of said case (1) adapted to position it quickly and accurately on a head (35) of said reading and/or writing device which itself comprises an antenna in the form of a coil (36) and has a recess (35') substantially the same shape and size as said boss (34).